Altivar® 61

Simplified manual

Variable speed drive controllers
for asynchronous motors

75–125 hp (55–90 kW) / 200–240 V
125–900 hp (90–639 kW) / 380–480 V

Retain for future use

a brand of Schneider Electric

Telemecanique

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Before you begin

Read and understand these instructions before performing any procedure on this drive controller.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK

- Read and understand this manual before installing or operating the Altivar 61 drive controller. Installation, adjustment, repair, and maintenance must be performed by qualified personnel.
- The user is responsible for compliance with all international and national electrical standards in force concerning protective grounding of all equipment.
- Many parts of this variable speed drive controller, including the printed circuit boards, operate at the line voltage. DO NOT TOUCH. Use only electrically insulated tools.
- DO NOT touch unshielded components or terminal strip screw connections with voltage present.
- DO NOT short across terminals PA and PC or across the DC bus capacitors.
- Install and close all the covers before applying power or starting and stopping the drive controller.
- Before servicing the variable speed drive controller:
  - Disconnect all power.
  - Place a “DO NOT TURN ON” label on the variable speed drive controller disconnect.
  - Lock the disconnect in the open position.
- Disconnect all power including external control power that may be present, before servicing the drive controller. WAIT 15 MINUTES for the DC bus capacitors to discharge. Then follow the DC bus voltage measurement procedure on page 15 to verify that the DC voltage is less than 45 V. The drive controller LEDs are not accurate indicators of the absence of DC bus voltage.

Electric shock will result in death or serious injury.

CAUTION

IMPROPER DRIVE OPERATION

- If, for prolonged period of time, voltage is not applied to the drive controller, the performance of its electrolytic capacitors will be reduced.
- If it is stopped for a prolonged period, turn the drive controller on every two years for at least 5 hours to restore the performance of the capacitors, then check its operation. It is recommended that the drive controller not be connected directly to the line voltage. The voltage should be increased gradually using an adjustable AC source.

Failure to follow this instruction can result in equipment damage.

Product Support

For more information, call, fax, or write:

Square D AC Drives Technical Support Group
P.O. Box 27446
Raleigh, NC 27611-7446

The Technical Support Group is staffed from 8 am to 6 pm Eastern time for product selection, start-up assistance, or diagnosis of product problems and advice for the correct course of action. **Emergency phone support** is available 24 hours a day, 365 days a year.

Toll free:	1-888-778-2733 (1-888-SquareD)
E-mail:	drive.products.support@us.schneider-electric.com
Fax Line:	919-217-6508

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Setting Up the Drive Controller

■ 1 Take delivery of the drive controller

- Ensure that the catalog number printed on the label is the same as that on the purchase order
- Remove the drive controller from its packaging and check that it has not been damaged in transit

■ 2 Check the line voltage

- Ensure that the line voltage is compatible with the voltage range of the drive controller

■ 3 Mount the drive controller

- Mount the drive controller according to the instructions in this document
- Install and connect the DC choke (page **7**)
- Install any internal and external options

■ 4 Wire the drive controller (page **16**)

- Connect the motor, ensuring that its connections correspond to the voltage
- With power off, connect the line supply
- Connect the control wiring
- Connect the speed reference

Steps 1 to 4 must be performed with the power off.

■ 5 Energize the drive controller with no inputs active

- Removing the control terminal card ensures no active inputs
  (page **19**)

■ 6 Select the language (page **28**)

if the drive controller is equipped with a graphic display terminal

■ 7 Configure the menu [SIMPLY START] (SIM-) (page **30**)

- 2-wire or 3-wire control
- Macro configuration
- Motor parameters

☞ **Optimize performance**

- Motor thermal current
- Acceleration and deceleration ramps
- Speed variation range

■ 8 Start

Note:

- To optimize performance, refer to the auto-tuning section, page **33.**

☞ ***Note: Ensure that the wiring of the drive controller is compatible with its configuration.***

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Receiving, Handling, and Storage

Handling and storage

Refer to “Dimensions and Weights”, page 13.
To protect the drive prior to installation, handle and store the device in its packaging. Ensure that the ambient conditions are acceptable.

⚠ WARNING

DAMAGED PACKAGING

If the packaging appears damaged, it can be dangerous to open it or handle it.

Failure to follow this instruction can result in death or serious injury.

⚠ WARNING

DAMAGED EQUIPMENT

Do not operate or install any drive that appears damaged.

Failure to follow this instruction can result in death or serious injury.

Unpacking and handling

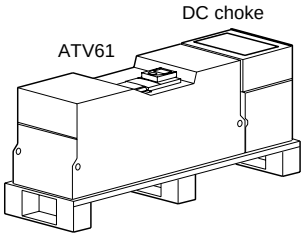

Figure 1

The packaging contains two items:
- The drive controller
- A DC choke, except for ATV61●●●D.

The drive and the DC choke are mounted on a pallet with screws (figure 1). When the DC choke is present, it is supplied already assembled to make it easier to transport.

The unit should be unpacked in the following order:

1 Disassemble the components of the DC choke (figure 2) for installation later, and remove the choke by means of a hoist (figure 3).

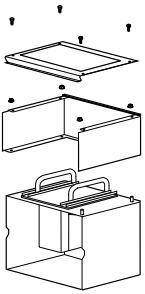

Figure 2

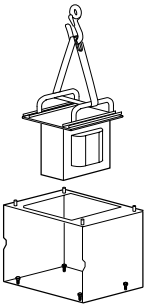

Figure 3

2 Remove the retaining screws (figure 3) from the choke support on the pallet.

⚠ WARNING

RISK OF CUTS

The retaining screws that hold the choke support on the pallet are difficult to access, leading to a risk of cutting oneself. To avoid the risk, use protective gloves.

Failure to follow this instruction can result in serious injury.

3 Remove the screws holding the drive controller on the pallet and lift off the drive controller by means of a hoist. The controller is fitted with handling lugs for this purpose (figure 4).

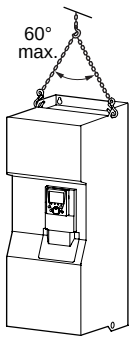

Figure 4

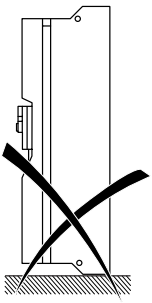

Figure 5

⚠ WARNING

RISK OF TOPPLING

Do not stand the drive controller upright (figure 5). Keep the drive controller on the pallet until it is installed.

Failure to follow this instruction can result in death, serious injury, or equipment damage.

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Installing the drive controller

- **Mount the drive controller** on a wall or the back of the enclosure according to the recommendations described in this document, before installing the DC choke.

Installing the DC choke

ATV61H D55M3XD to D90M3XD and ATV61H D90N4D to C63N4D drives are supplied without a DC choke. Drives supplied without a DC bus choke require an input line reactor. For assistance, contact your local Schneider Electric representative. ATV61H D55M3X to D90M3X and ATV61H D90N4 to C63N4 drives are supplied with a DC choke that must be installed on top of the drive and wired according to the recommendations described in this document. This choke must be used for connecting drives to the 3-phase line supply.

Mount the DC choke on the back of the enclosure or on the wall on top of the drive and follow the instructions for installing and connecting the choke given on page 8.
Ensure that the chassis is tightly secured to the drive.

Before You Begin

You must observe the following precautions.

CAUTION

INCOMPATIBLE LINE VOLTAGE

Before turning on and configuring the drive controller, ensure that the line voltage is compatible with the supply voltage range shown on the drive controller nameplate. The controller may be damaged if the line voltage is not compatible.

Failure to follow this instruction can result in equipment damage.

DANGER

UNINTENDED EQUIPMENT OPERATION

- Before turning on and configuring the Altivar 61 drive controller, ensure that the PWR (POWER REMOVAL) input is deactivated (at state 0) in order to prevent unintended operation.
- Before turning the drive on or on exiting the configuration menus, check that the inputs assigned to the run command are deactivated (at state 0) since they can cause the motor to start immediately.
- Refer to the characteristics and functions table in the Control Terminals section for more information about the Power Removal Input.

Failure to follow these instructions will result in death or serious injury.

The Power Removal function takes priority over any run command. For use as an emergency stop, this function requires the use of connection diagrams conforming to category 3 of standard EN 954-1 and safety integrity level 2 according to IEC/EN 61508. Consult the ATV61 installation manual on theCD-ROM supplied with the drive controller.

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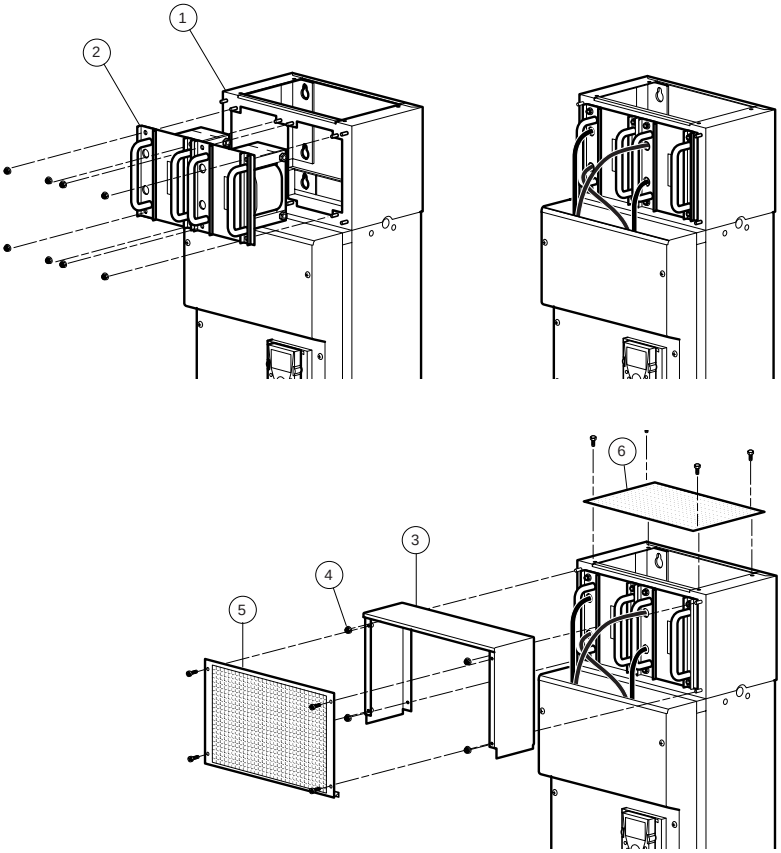
Example of installing DC chokes on an ATV61HC22N4



- Mount the DC choke chassis ① on the wall, on top of the drive controller. Ensure that the chassis is tightly secured to the drive controller to maintain the IP54 seal of the ventilation duct.
- Install the DC choke ② on the chassis ① using the nuts provided.
- Connect the choke between the PO and PA/+ terminals on the drive controller (see the next page).
- Connect the grounding strip between the DC choke chassis ① and the drive controller.
- Mount the cover ③ on the chassis and secure it with the nuts ④ provided.
- Mount panels ⑤ and ⑥ using the screws provided.

Once the choke has been installed, the degree of protection for the top of the drive controller is IP31.

Note: The number of DC chokes supplied with the drive controller varies according to the drive rating.

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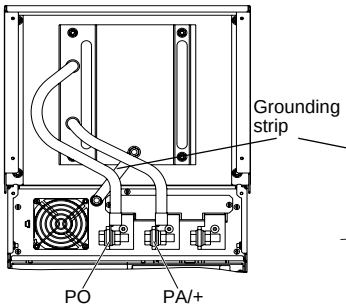
Between 1 and 4 chokes can be connected in parallel as described in the following examples.

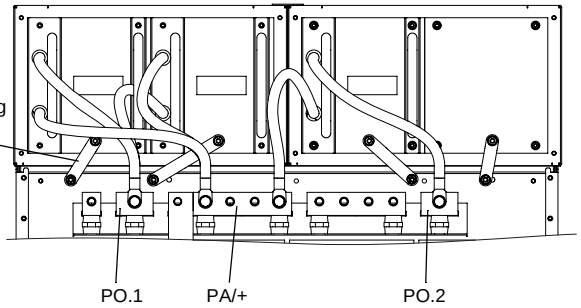
Table of drive/choke combinations

Drive Controller	Number of chokes in parallel	Choke model
ATV61HD55M3X, D75M3X	1	DC-CHOKE 5
ATV61HD90M3X	1	DC-CHOKE 6
ATV61HD90N4, C11N4	1	DC-CHOKE 1
ATV61HC13N4	1	DC-CHOKE 2
ATV61HC16N4	1	DC-CHOKE 4
ATV61HC22N4	2	DC-CHOKE 1
ATV61HC25N4	2	DC-CHOKE 3
ATV61HC31N4	2	DC-CHOKE 4
ATV61HC40N4	3	DC-CHOKE 3
ATV61HC50N4	4	DC-CHOKE 2
ATV61HC63N4	4	DC-CHOKE 7

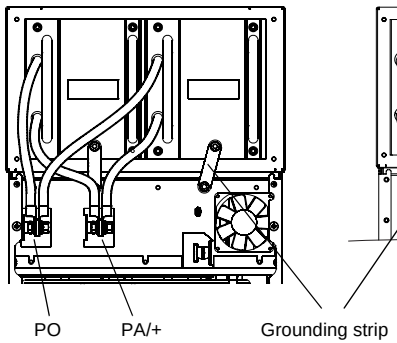
Example 1:
ATV61HD55M3X...D90M3X,
ATV61HD90N4...C16N4



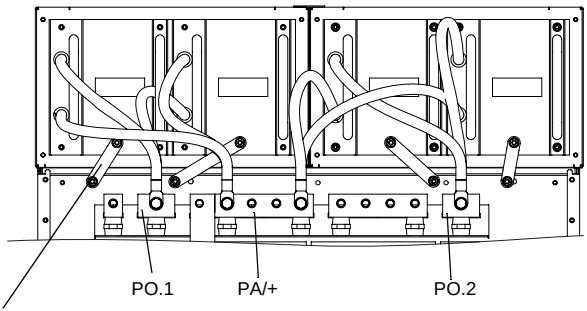
Example 3:
ATV61HC40N4



Example 2:
ATV61HC22N4...C31N4



Example 4:
ATV61HC50N4...C63N4



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Mounting in a Wall-Mounted or Floor-Standing Enclosure

Install the drive controller vertically, ± 10°. Do not place it close to heating elements.

Mounting with the heatsink inside the enclosure

The power dissipated by the drive controller power components is given in the table below.

Dissipated power

These levels of power dissipation are given for operation at nominal load and for a switching frequency of 2.5 Hz.

The drive controller has a fan for cooling the power components. The air is circulated from the bottom to the top of the unit via a duct (the duct is shown shaded gray on the diagram below). This duct is isolated from the control section by IP54 protection. The DC choke extends this duct while maintaining IP54 protection.

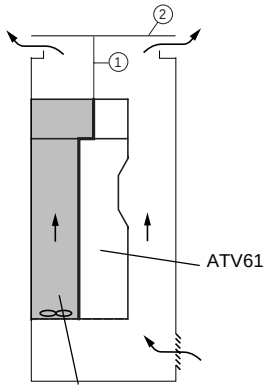
ATV61H	Power dissipated W
D55M3X	1715
D75M3X	2233
D90M3X	2694
D90N4	2403
C11N4	3056
C13N4	3583
C16N4	4036

ATV61H	Power dissipated W
C22N4	5482
C25N4	6379
C31N4	7867
C40N4	9598
C50N4	12055
C63N4	15007

The drive controller dissipates a great deal of power which must be evacuated to the outside of the enclosure.
Air inlets and outlets must be provided to ensure that the flow of air in the enclosure is at least equal to the value given in the table below for each drive controller.

ATV61H	Flow rate	
	m^3/hour	ft^3/min
D55M3X, D75M3X, D90N4, C11N4	402	236
D90M3X, C13N4	774	455
C16N4	745	438
C22N4	860	506
C25N4, C31N4	1260	742
C40N4, C50N4	2100	1236
C63N4	2400	1412

Figure 1



Several methods of evacuation are possible. The following are proposed methods for IP23 and IP54 mounting.

IP23 mounting (standard operating conditions):

Figure 1
A. Install the drive controller on an enclosure baseplate.
B. Install the DC choke according to the mounting recommendations.
The simplest mounting is to extend the IP54 duct between the upper outlet of the DC choke and the top of the enclosure (1) . Mounting points are provided for this purpose on the top of the DC choke.
The hot air is thus evacuated to the outside and does not contribute towards increasing the internal temperature of the enclosure.
C. It is advisable to add a plate (2) approximately 5.905 in. (150 mm) from the top of the enclosure over the air outlet opening to prevent foreign bodies from falling into the drive controller cooling duct.
D. The air inlet can be via a grille on the bottom front panel of the enclosure door, according to the required flow rates given in the above table.

Figure 2

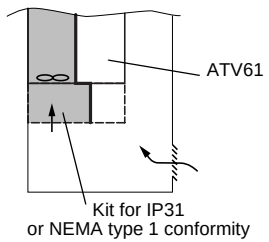


Figure 2
It is advisable to use a kit for IP31/UL type 1 conformity (ordered as an option) for attaching the power cables. The design of the IP31 kit is based on the same principle as the DC choke, and has an IP54 duct to help guide the incoming air.

Note:
• If the air in the power circuit is totally evacuated to the outside, very little power is dissipated inside the enclosure. In this case, use the dissipated power table for dust-and-damp-proof-flange-mounting (see page 11).
• Ground all metal parts according to local and national codes.

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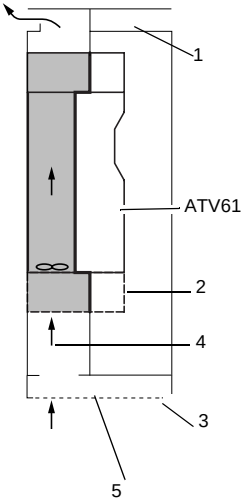


Mounting with the heatsink inside the enclosure (continued)

IP54 mounting (standard operating conditions):

The drive controller must be mounted in an IP54 enclosure in certain environmental conditions: dust, corrosive gases, high humidity with risk of condensation and dripping water, splashing liquid, etc.

The simplest way of obtaining an enclosure with IP54 protection is to follow the mounting recommendations for IP23 protection with the following 5 additional points:

1. Do not make an air outlet hole for the control section. Do not make an air inlet hole in the enclosure door. In the power section, the air will enter through the bottom of the enclosure via a plinth added for this purpose.

2. Add the IP31 or UL type 1 conformity kit according to the mounting instructions. Refer to the manual supplied with the kit.

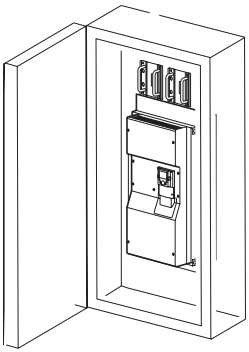
3. Add an enclosure baseplate designed to provide IP54 protection around the power cables.

4. Add an air evacuation duct between the baseplate and the duct of the IP31 or UL type 1 conformity kit. The IP31 or UL type 1 conformity kit enables an extension duct to be mounted. Drill a hole in the base of the enclosure to allow air to enter. Place seals around the duct that has been added to maintain IP54 protection.

5 Add a 200 mm plinth at the bottom of the enclosure with grilles to allow air to enter.

6 Refer to the derating tables in the installation guide to calculate the enclosure dimensions.

Note: Ground all metal parts according to local and national codes.



Dust-and-damp-proof flange-mounting (heatsink outside the enclosure)

This mounting method is used to reduce the power dissipated in the enclosure by locating the power section outside the enclosure.
This requires the use of the dust-and-damp-proof flange-mounting kit VW3A9509...517 (refer to the catalog). To assemble the kit to the drive controller, refer to the manual supplied with the kit.
The degree of protection for the drive controller mounted in this way becomes IP54.

- Refer to the derating tables in the installation guide to calculate the enclosure dimensions.
- In this case the DC choke can be installed directly on the back of the enclosure.

Power dissipated by the control section inside the enclosure (for calculating the enclosure dimensions)

These power ratings are given for operation at nominal load and for the factory-set switching frequency.

ATV61H	Dissipated power in W(1)
D55M3X	154
D75M3X	154
D90M3X	154
D90N4	237
C11N4	269
C13N4	304

ATV61H	Dissipated power in W(1)
C16N4	362
C22N4	452
C25N4	606
C31N4	769
C40N4	-
C50N4, C63N4	-

(1) Add 7 W to this value for each option card added.
If the hot air exiting the drive controller is not ducted and evacuated to the outside, it risks being sucked back in, making the ventilation totally ineffective. To avoid this, leave sufficient free space around the drive controller, as indicated below.
The enclosure must be cooled in order to get rid of the dissipated heat.

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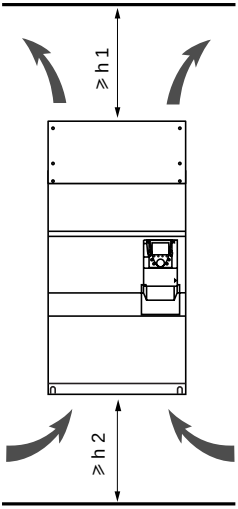

ATV61H	h1		h2	
	mm	in.	mm	in.
D55M3X...D90M3X, D90N4, C11N4	100	3.94	100	3.94
C13N4...C22N4	150	5.90	150	5.90
C25N4, C31N4	200	7.83	150	5.90
C40N4, C50N4	300	11.81	250	9.84
C63N4	400	15.75	250	9.84

Free space in front of the drive controller: 10 mm (0.39 in.) minimum

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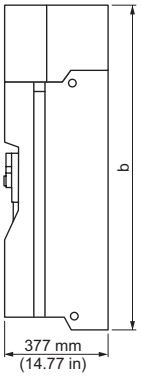
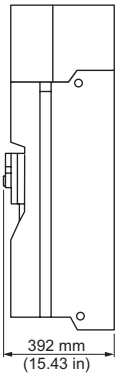
Dimensions and Weights

With graphic display terminal

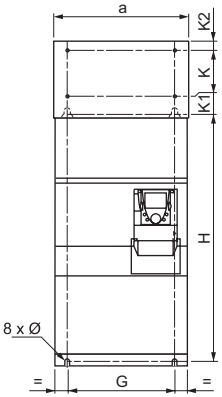
With 0 or 1 option card (1)



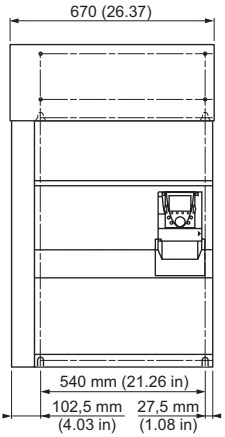
2 option cards (1)



ATV61H D55M3X to D90M3X
ATV61H D90N4 to C31N4



ATV61H C25N4 to C31N4
with braking unit



Dimensions

ATV61H	a mm (in.)	b mm (in.)	G mm (in.)	H mm (in.)	K mm (in.)	K1 mm (in.)	K2 mm (in.)	Ø mm (in.)	For screws	weight kg (lb.)
D55M3X, D90N4	320 (12.60)	920 (36.22)	250 (9.84)	650 (25.59)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)	M10	60 (132)
D75M3X, C11N4										74 (163)
C13N4, D90M3X	360 (14.17)	1022 (40.23)	298 (11.73)	758 (29.84)	150 (5.91)	72 (2.83)	30 (1.18)	11.5 (0.45)	M10	80 (176)
C16N4	340 (13.39)	1190 (46.62)	285 (11.22)	920 (36.22)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)	M10	110 (242)
C22N4	440 (17.32)	1190 (46.62)	350 (13.78)	920 (36.22)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)	M10	140 (309)
C25N4	595 (23.43)	1190 (46.62)	540 (21.26)	920 (36.22)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)	M10	140 (309)
C31N4										215 (474)

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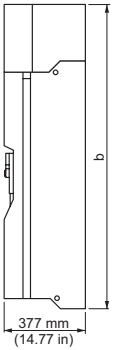
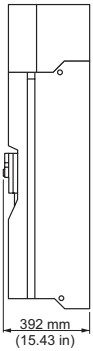
With graphic display terminal (continued)

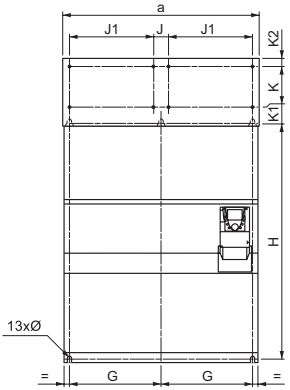
With 0 or 1 option card (1)



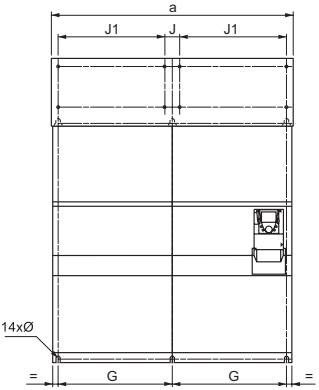
2 option cards (1)



ATV61H C40N4 to C50N4



ATV61H C63N4



Dimensions												
ATV61H	a mm (in.)	b mm (in.)	G mm (in.)	J mm (in.)	J1 mm (in.)	H mm (in.)	K mm (in.)	K1 mm (in.)	K2 mm (in.)	Ø mm (in.)	For screws	weight kg (lb.)
C40N4	890 (35.04)	1390 (54.72)	417.5 (16.44)	70 (2.76)	380 (14.96)	1120 (44.09)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)	M10	225 (496)
C50N4												300 (661)
C63N4	1120 (44.09)	1390 (54.72)	532.5 (20.96)	70 (2.76)	495 (1949)	1120 (44.09)	150 (5.91)	75 (2.95)	30 (1.18)	11.5 (0.45)	M10	300 (661)

(1) For the addition of I/O extension cards, communication cards, the multi-pump card, or the "Controller Inside" programmable card.

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DC Bus Voltage Measurement Procedure

Before working on the drive controller, turn it off and wait 15 minutes to allow the DC bus to discharge. Then measure the DC bus voltage.

Measuring the DC bus voltage

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Read and understand the instructions on page 2 before performing this procedure.

Failure to follow this instruction will result in death or serious injury.

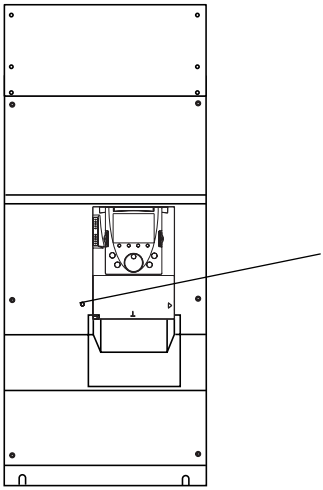
The DC bus voltage can exceed 1,000 V ⎓. Use a properly rated voltage-sensing device when performing this procedure. To measure the DC bus voltage:

1 Disconnect the drive controller power supply.

2 Wait 15 minutes to allow the DC bus to discharge.

3 Measure the voltage of the DC bus between the PA/+ and PC/– terminals to ensure that the voltage is less than 45 V ⎓.

4 If the DC bus capacitors do not discharge completely, contact your local Schneider Electric representative. Do not repair or operate the drive controller.



Red LED indicating that the DC bus is turned on. (The drive controller LEDs are not accurate indicators of the absence of DC bus voltage.)

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Wiring

Power

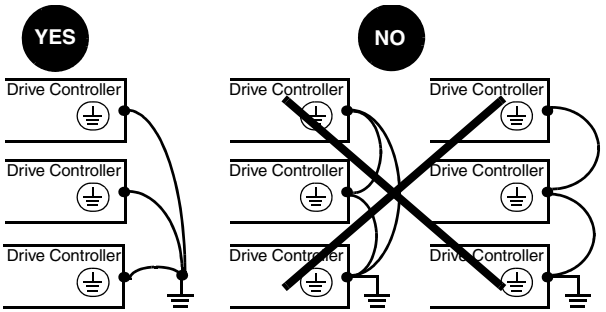
Ground the drive controller to local and national code requirements. A minimum wire size of 6 AWG may be required to meet standards limiting leakage current.

DANGER

HAZARD OF ELECTRIC SHOCK

Ground equipment using the provided ground connecting point as shown in the figure below. The drive panel must be properly grounded before power is applied.

Failure to follow this instruction will result in death or serious injury.



- Ensure that the resistance of the protective ground is 1 Ω or less.
- If connecting several drive controllers to the protective ground, you must connect each one directly, as shown in the figure to the left.
- Do not loop the ground cables or connect them in series.

WARNING

EQUIPMENT DAMAGE

- The ATV61 controller will be damaged if input line voltage is applied to the output terminals (U/T1,V/T2,W/T3).
- Check the power connections before energizing the ATV61 drive controller.
- If replacing another drive controller, verify that all wiring connections to the ATV61 controller comply with all wiring instructions in this manual.

Failure to follow this instruction can result in death, serious injury, or equipment damage.

Where local and national codes require upstream protection by means of a residual current device, use a type A device for single-phase drives and a type B device for three-phase drives. Choose a suitable model integrating:

- HF current filtering
- A time delay that prevents tripping caused by the load from stray capacitance on power-up. The time delay is not possible for 30 mA devices; in this case, choose devices with immunity against nuisance tripping—for example, residual current devices with reinforced immunity from the s.i range (Merlin Gerin brand).

If the installation includes several drive controllers, provide one residual current device per controller.

WARNING

INADEQUATE OVERCURRENT PROTECTION

- Overcurrent protective devices must be properly coordinated.
- The Canadian Electricity Code and the National Electrical Code require branch circuit protection. Use the fuses recommended on the drive controller nameplate to achieve published short-circuit current ratings.
- Do not connect the drive controller to a power feeder whose short-circuit capacity exceeds the controller short-circuit current rating listed on the controller nameplate.

Failure to follow this instruction can result in death, serious injury, or equipment damage.

CAUTION

IMPROPER USE OF A BRAKING RESISTOR

Wire the thermal protection contact on the resistor so that the drive controller power supply is disconnected immediately in the event of a fault (refer to the manual supplied with the resistor).

Failure to follow this instruction can result in equipment damage.

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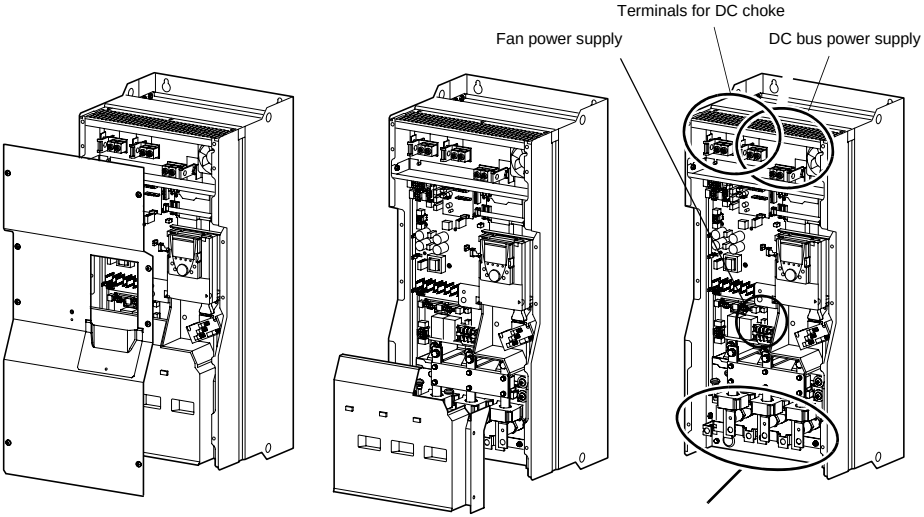
Power Terminals

Access to the power terminals

To access the power terminals, unscrew the front panel and remove the protective cover


Terminals for DC choke
Fan power supply
DC bus power supply
• Power section line supply
• Output to the motor
• Connections to ground
• Output to braking resistor
(up to ATV61HC16N4 rating only)

Functions of power terminals

Terminals	Function	Altivar 61 controller
3 x ⏚	Protective ground connection terminals	All ratings
R/L1, S/L2, T/L3 (1)	Power section line supply	All ratings
PO	Connection of the DC choke	ATV61H D55M3X to D90M3X ATV61H D90N4 to C31N4
PO.1, PO.2	Connection of the DC choke	ATV61H C40N4 to C63N4
PA/+	DC bus + polarity and connection of the DC choke	All ratings
PC/-	DC bus - polarity	All ratings
PA	Output to braking resistor	ATV61H D55M3X to D90M3X ATV61H D90N4 to C22N4 (2)
PB	Output to braking resistor	
U/T1, V/T2, W/T3	Output to the motor	All ratings
RO, SO, TO	Separate fan supply when the drive controller is only powered only by the DC bus (consult the CD-ROM supplied with the drive controller)	ATV61H D75M3X, D90M3X ATV61H C13N4 to C63N4
BU+, BU-	+ and - polarities to be connected to the braking unit	ATV61H C25N4 to C63N4 (refer to the User's Manual for the braking unit)
X20, X92, X3	Connection of the braking unit control cable	

(1) ATV61H C40N4 to C63N4 drives have two input bridges. The power section line supply is connected on terminals R/L1.1 - R/L1.2, S/L2.1 - S/L2.2 and T/L3.1 - T/L3.2.
(2) For ATV61HC25N4 and higher, there are no braking resistor connection terminals on the drive, since the braking unit is optional (refer to the catalog). The braking resistor is connected on the braking unit.

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Power Terminals

Maximum wire size/tightening torque

The AWG/MCM ratings use aluminum lugs.

Drive terminals	L1/R, L2/S, L3/T	R/L1.1, R/L1.2, S/L2.1, S/L2.2, T/L3.1, T/L3.2	U/T1, V/T2, W/T3	PC/-, PA/+	PA, PB
ATV 61HD55M3X ATV 61HD75M3X ATV 61HD90N4 ATV 61HC11N4	2 x 100 mm^2 / 24 N•m	-	2 x 100 mm^2/ 24 N•m	2 x 100 mm^2/ 41 N•m	60 mm^2/ 12 N•m
	2 x 250 MCM/ 275 lb-in	-	2 x 250 MCM/ 275 lb-in	2 x 250 MCM/ 275 lb-in	250 MCM/ 275 lb-in
ATV 61HD90M3X ATV 61HC13N4	2 x 100 mm^2/ 24 N•m	-	2 x 100 mm^2/ 24 N•m	2 x 150 mm^2/ 41 N•m	60 mm^2/ 12 N•m
	2 x 250 MCM/ 275 lb-in	-	2 x 250 MCM/ 275 lb-in	2 x 250 MCM/ 275 lb-in	250 MCM/ 275 lb-in
ATV 61HC16N4	2 x 120 mm^2/ 24 N•m	-	2 x 120 mm^2/ 24 N•m	2 x 120 mm^2/ 41 N•m	120 mm^2/ 24 N•m
	2 x 250 MCM/ 275 lb-in	-	2 x 250 MCM/ 275 lb-in	2 x 250 MCM/ 275 lb-in	250 MCM/ 275 lb-in
ATV 61HC22N4	2 x 150 mm^2/ 41 N•m	-	2 x 150 mm^2/ 41 N•m	2 x 150 mm^2/ 41 N•m	120 mm^2/ 24 N•m
	2 x 350 MCM/ 375 lb-in	-	2 x 350 MCM/ 375 lb-in	2 x 350 MCM/ 375 lb-in	250 MCM/ 275 lb-in
ATV 61HC25N4 ATV 61HC31N4	4 x 185 mm^2/ 41 N•m	-	4 x 185 mm^2/ 41 N•m	4 x 185 mm^2/ 41 N•m	-
	3 x 350 MCM/ 375 lb-in	-	3 x 350 MCM/ 375 lb-in	3 x 350 MCM/ 375 lb-in	-
ATV 61HC40N4	4 x 185 mm^2/ 41 N•m	-	4 x 185 mm^2/ 41 N•m	8 x 185 mm^2/ 41 N•m	-
	4 x 500 MCM/ 365 lb-in	-	4 x 500 MCM/ 375 lb-in	4 x 500 MCM/ 375 lb-in	-
ATV 61HC50N4	-	2 x 2 x 185 mm^2/ 41 N•m	4 x 185 mm^2/ 41 N•m	8 x 185 mm^2/ 41 N•m	-
	-	4 x 500 MCM/ 375 lb-in	4 x 500 MCM/ 375 lb-in	4 x 500 MCM/ 375 lb-in	-
ATV 61HC63N4	-	2 x 4 x 185 mm^2/ 41 N•m	6 x 185 mm^2/ 41 N•m	8 x 185 mm^2/ 41 N•m	-
	-	3 x 500 MCM/ 375 lb-in	5 x 500 MCM/ 375 lb-in	5 x 500 MCM/ 375 lb-in	-

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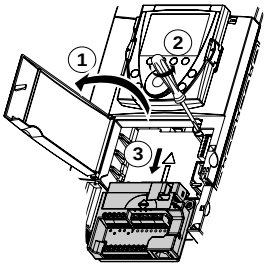
Control Terminals

Access to the control terminals



1 To access the control terminals, open the cover on the control front panel.

2 To make it easier to wire the drive control section, the control terminal card can be removed.

- Undo the screw until the spring is fully extended.
- Remove the card by sliding it downwards.

Maximum wire size: 2.5 mm² (14 AWG)

Maximum tightening torque: 0.6 N•m (5.3 lb-in)

⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

- The accidental grounding of logic inputs configured for Sink Logic can result in unintended activation of drive controller functions.
- Protect the signal conductors against damage that could result in unintentional conductor grounding.
- Follow NFPA 79 and EN 60204 guidelines for proper control circuit grounding practices.

Failure to follow these instructions will result in death or serious injury.

CAUTION

IMPROPERLY SECURED TERMINAL CARD

When replacing the control terminal card, it is essential to fully tighten the captive screw.

Failure to follow this instruction can result in equipment damage.

Characteristics and functions of the control terminals

Terminals	Function	Electrical characteristics
R1A R1B R1C	1 relay logic output, one N.C. contact and one N.O. contact with common point (R1A to R1C is N.O.; R1B to R1C is N.C.)	Minimum switching capacity: 3 mA for 24 V ⎓ Maximum switching capacity: • on resistive load (cos φ = 1): 5 A for 250 V ∿ or 30 V ⎓ • on inductive load (cos φ = 0.4 and L/R = 7 ms): 2 A for 250 V ∿ or 30 V ⎓ Max. response time: 7 ms ±0.5 ms • Electrical service life: 100,000 operations
R2A R2C	1 relay logic output, one N.O. contact	

+10	+10 V ⎓ power supply for reference potentiometer 1 to 10 kΩ	• +10 V ⎓ (10.5 V ± 0.5V) • 10 mA max.
AI1+ AI1 -	Differential analog input AI1	• -10 to +10 V ⎓ (max. safe voltage 24 V) • Reaction time: 2 ms ± 0.5 ms, 11-bit resolution + 1 sign bit • Accuracy ± 0.6% for ΔΘ = 60 °C (140 °F), linearity ± 0.15% of max. value
COM	Analog I/O common	0 V
AI2	Depending on software configuration: Analog voltage or current input	• Analog input 0 to +10 V c (max. safe voltage 24 V), impedance 30 kΩ • Analog input X - Y mA, X and Y can be programmed from 0 to 20 mA, impedance 250 Ω • Reaction time: 2 ms ± 0.5 ms • 11-bit resolution, accuracy ± 0.6% for ΔΘ = 60 °C (140 °F), linearity ± 0.15% of max. value
COM	Analog I/O common	0 V
AO1	Depending on software configuration: Analog voltage or current output	• Analog output 0 to +10 V ⎓, min. load impedance 50 kΩ • Analog output X - Y mA, X and Y can be programmed from 0 to 20 mA max. load impedance 500 Ω • 10-bit resolution, reaction time: 2 ms ± 0.5 ms • Accuracy ± 1% for ΔΘ = 60 °C (140 °F), linearity ± 0,2% of max. value

Note: ΔΘ = temperature variation

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Characteristics and functions of the control terminals *(continued)*

Terminals	Function	Electrical characteristics
P24	Input for external +24 V⎓ control power supply	• +24 V ⎓ (min. 19 V, max. 30 V) • Power 30 W
0V	Logic input common and 0V of P24 power supply	0 V
LI1 LI2 LI3 LI4 LI5	Programmable logic inputs	• +24 V ⎓ (max. 30 V) • Impedance 3.5 kΩ • Reaction time: 2 ms ± 0.5 ms SW1 switch / State 0 / State 1 Source (factory setting) / < 5 V ⎓ / > 11 V ⎓ Sink Int or Sink Ext / > 16 V ⎓ / < 10 V ⎓
LI6	Depending on the position of the SW2 switch. • Programmable logic input or • Input for PTC probes	SW 2 switch on LI (factory setting) • Same characteristics as logic inputs LI1 to LI5 or SW2 switch on PTC • Trip threshold 3 kΩ, reset threshold 1.8 kΩ • Short-circuit detection threshold < 50 Ω
+24	Logic input power supply	SW1 switch in Source or Sink Int position: • Internal +24 V ⎓ power supply (min. 21 V, max. 27 V) protected against short-circuits and overloads • 200 mA maximum current SW1 switch in Sink Ext position: • Input for external +24 V ⎓ power supply for the logic inputs
PWR	Power Removal safety function input When PWR is not connected to 24 V, the motor cannot be started (compliance with functional safety standard EN 954-1 and IEC/EN 61508)	• 24 V ⎓ (max. 30 V) • Impedance 1.5 kΩ • State 0 if < 2 V, state 1 if > 17 V • Reaction time: 10 ms

Note: ΔΘ = temperature variation

Logic I/O option card terminals (VW3A3201)

Characteristics and functions of the terminals

⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

- The accidental grounding of logic inputs configured for Sink Logic can result in unintended activation of drive controller functions.
- Protect the signal conductors against damage that could result in unintentional conductor grounding.
- Follow NFPA 79 and EN 60204 guidelines for proper control circuit grounding practices.

Failure to follow these instructions will result in death or serious injury.

Maximum wire size: 1.5 mm² (16 AWG)
Max. tightening torque: 0.25 N•m (2.21 lb-in)

R3A to LI10: Same characteristics as for the control card.

Terminals	Function	Electrical characteristics
TH1+ TH1-	PTC probe input	• Trip threshold 3 kΩ, reset threshold 1.8 kΩ • Short-circuit detection threshold < 50 Ω
LO1 LO2	Open collector programmable logic outputs	• +24 V ⎓ (max. 30 V) • Max. current 200 mA for internal power supply and 200 mA for external power supply
CLO	Logic output common	
0V	0 V	0 V

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Extended I/O option card terminals (VW3A3202)

Characteristics and functions of the terminals

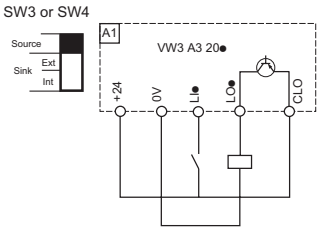
DANGER

UNINTENDED EQUIPMENT OPERATION

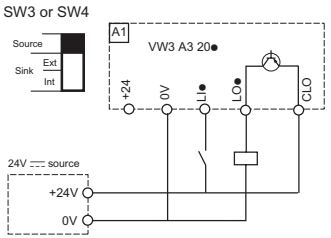
- The accidental grounding of logic inputs configured for Sink Logic can result in unintended activation of drive controller functions.
- Protect the signal conductors against damage that could result in unintentional conductor grounding.
- Follow NFPA 79 and EN 60204 guidelines for proper control circuit grounding practices.

Failure to follow these instructions will result in death or serious injury.

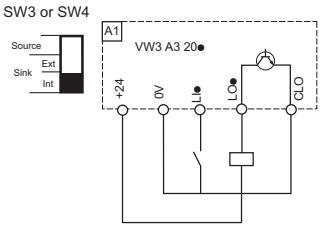
• Switch in "Source" position



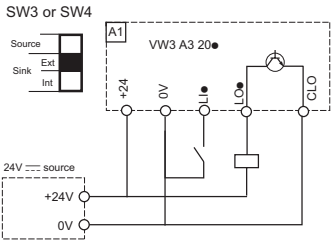
• Switch in "Source" position and use of an external +24 V ⎓ source



• Switch in "Sink Int" position



• Switch in "Sink Ext" position



Maximum wire size: 1.5 mm² (16 AWG)
Max. tightening torque: 0.25 N•m (2.21 lb-in)

R4A to LI14: Same characteristics as for the control card.

Terminals	Function	Electrical characteristics
TH2 + TH2 -	PTC probe input	• Trip threshold 3 kΩ, reset threshold 1.8 kΩ • Short-circuit detection threshold < 50 Ω
RP	Frequency input	• Frequency range: 0…30 kHz • Cyclic ratio: 50% ± 10% • Maximum sampling time: 5 ms ± 1 ms • Maximum input voltage 30 V, 15 mA • Add a resistor if the input voltage is greater than 5V (510 Ω for 12 V, 910 Ω for 15 V, 1.3 kΩ for 24 V) • State 0 if < 1.2V, state 1 if > 3.5V
LO3 LO4	Open collector programmable logic outputs	• +24 V ⎓ (max. 30 V) • Max. current 20 mA for internal power supply and 200 mA for external power supply • Reaction time 5 ms ± 1ms
CLO	Logic output common	
0V	0 V	0 V

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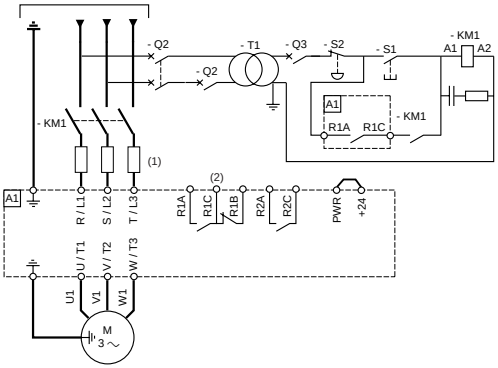
Connection Diagrams

Connection diagrams conforming to standard EN 954-1 category 1, with line contactor

3-phase power supply

ATV61HD55M3X...D90M3X and ATV61HD90N4...C40N4



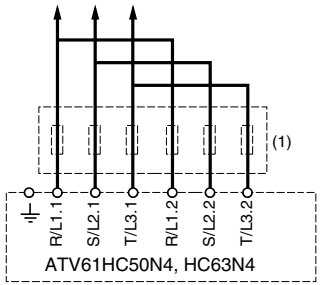
Note:
- Install interference suppressors on all inductive circuits near the drive controller or coupled to the same circuit (relays, contactors, solenoid valves, etc).
- If the PWR input has been wired up, use shielded cable.

(1) Line choke (if used)
(2) Fault relay contacts, for remote signaling of drive controller status

Associated components:
Refer to the catalog.

Power terminal connection diagram

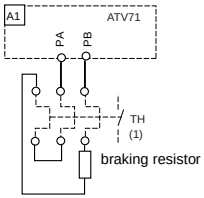
ATV61HC50N4 and ATV61HC63N4



(1) Line choke (if used)

Braking resistor connection diagram

ATV61HD55M3X...D90M3X and ATV61HD90N4...C22N4



Up to 220 kW power (ATV61HC22N4), braking resistors are connected directly to the terminals at the base of the drive (terminals PA and PB)

(1) Thermal overload relay

ATV61HC25N4...C63N4

For 250 kW and higher (ATV61HC25N4), the braking resistors are connected on the external braking unit. Refer to the braking unit User's Manual.

Drive controller supplied by the DC bus

Consult the CD-ROM supplied with the drive controller.

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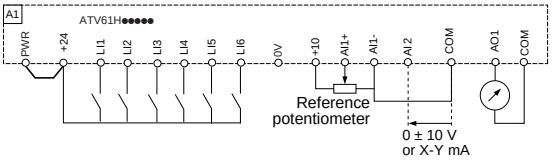
Control connection diagrams

Control card connection diagram



For other types of diagram (external 24 V power supply, negative logic, etc), consult the CD-ROM supplied with the drive controller.

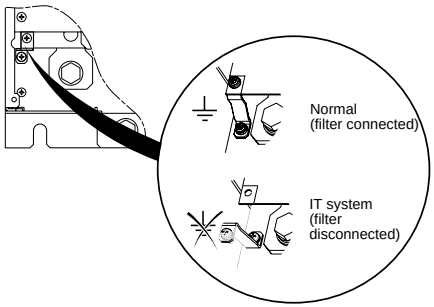
Operation on IT and Delta Systems

IT system: Isolated, impedance grounded neutral, and Delta.
Use a permanent insulation monitor compatible with non-linear loads, such as a Merlin Gerin type XM200 or equivalent.

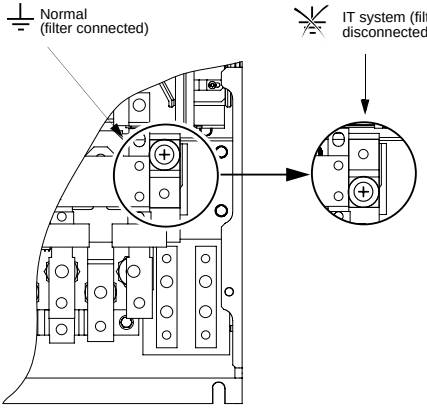
Altivar 61 drive controllers feature built-in RFI filters. These filters can be isolated from ground for operation on an IT system as follows:

Disconnection of RFI filters

ATV61H D55M3X to D90M3X and ATV61H D90N4 to C13N4:



ATV61H C16N4 to C22N4:



CAUTION
EQUIPMENT DAMAGE
When the filters are disconnected, the drive controller switching frequency must not exceed 4 kHz. Refer to the Programming Manual on the CD-ROM supplied with the drive controller to adjust parameter SFr.
Failure to follow this instruction can result in equipment damage.

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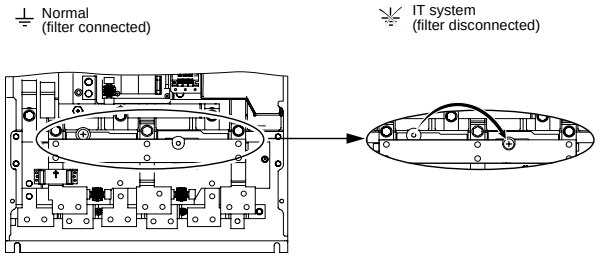
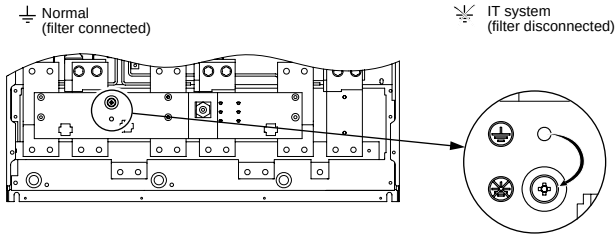
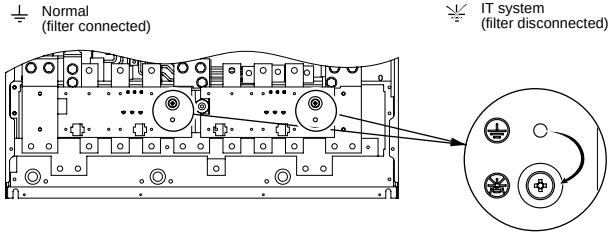
ATV61H C25N4 to C31N4:



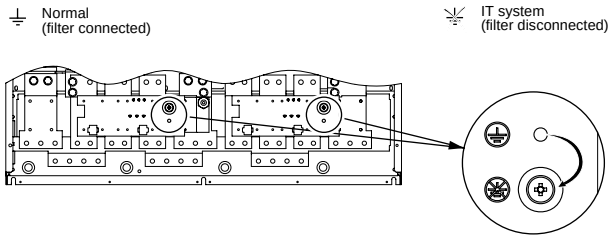
ATV61H C40N4



ATV61H C50N4



ATV61H C63N4



CAUTION

EQUIPMENT DAMAGE

When the filters are disconnected, the drive controller switching frequency must not exceed 4 kHz. Refer to the Programming Manual on the CD-ROM supplied with the drive controller to set the corresponding parameter.

Failure to follow this instruction can result in equipment damage.

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Electromagnetic Compatibility, Wiring

Principles and best practices

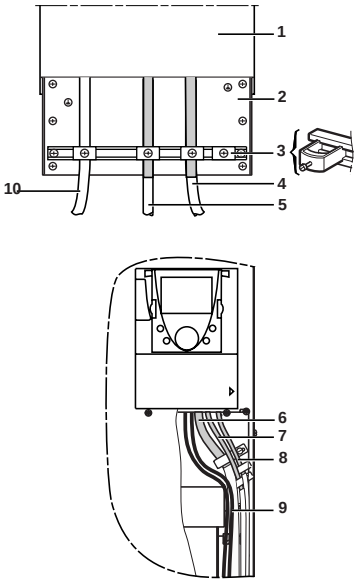
- Grounds between drive controller, motor, and cable shielding must have high frequency equipotentiality.
- Use shielded cables with shielding connected to ground at both ends for the motor cables, braking resistor (if used) and control-signal wiring. Metal ducting or conduit can be used for part of the shielding length, provided there is no break in continuity.
- Keep the control circuits away from the power circuits. For control and speed reference circuits, we recommend using shielded twisted cables with a pitch of between 25 and 50 mm (0.98 and 1.97 in.)
- Ensure maximum separation between the power supply cable (line supply) and the motor cable.
- The motor cables must be at least 0.5 m (20 in.) long.
- Do not use surge arresters or power factor correction capacitors on the variable speed drive controller output.
- If using an additional input filter, mount it under the drive controller and connect it directly to the line supply via an unshielded cable. Link 10 on the drive controller is then via the filter output cable.
- The HF equipotential ground connection between the drive controller, motor, and cable shielding does not eliminate the need to connect the PE protective conductors (green-yellow) to the appropriate terminals on each unit.

Installation diagram

ATV61H D55M3X to D90M3X and ATV61H D90N4 to C63N4

Attach and ground the shielding of cables of cables **4**, **5**, **6**, **7**, and **8** as close as possible to the drive controller.

- Strip the cable to expose the shielding.
- Use stainless metal cable clamps to attach the parts from which the shieding has been stripped
- The shiedling must be clamped tightly enough to the metal sheet to ensure proper contact.
- The shielding must be continuous and intermediate terminals must be in EMC shielded metal boxes.



1 Altivar 61 drive controller

2 Sheet steel grounded plate supplied with the drive controller

3 Metal clamps

4 Shielded cable for motor connection with shielding connected to ground at both ends.

5 Shielded cable for connecting the braking resistor (if used).

6 Shielded cables for connecting the control-signal cables. For applications requiring several conductors, use cables with a small cross-section, 20 AWG ($0.5\ mm^2$).

7 Shielded cables for connecting the Power Removal safety function input.

8 Shielded cables for connecting the encoder.

9 Unshielded wires for relay contact output

10 Unshielded power supply wires or cables

Note:

- If using an additional input filter, it should be connected directly to the line supply via an unshielded cable. Link 10 on the drive controller is then via the filter output cable.
- The HF equipotential ground connection between the drive controller, motor, and cable shielding does not eliminate the need to connect the PE protective conductors (green-yellow) to the appropriate terminals on each unit.

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Setup—Preliminary Recommendations

Drive controller settings (factory configuration)

The Altivar 61 drive controller is factory set for the following operations:
- Macro-configuration: Pumps/fans
- **Motor** frequency: 50 Hz
- Energy-saving variable torque applications
- Normal stop mode on deceleration ramp
- Stop mode in the event of a fault: freewheel
- Linear, acceleration and deceleration ramps: 3 seconds
- Low speed: 0 Hz
- High speed: 50 Hz
- Motor thermal current = rated drive current
- Standstill injection braking current = 0.7 x rated drive current, for 0.5 seconds
- No automatic starts after a fault
- Switching frequency 2.5 kHz to 12 kHz depending on drive rating
- Logic inputs:
  - LI1: forward (1 operating direction), 2-wire control on transition
  - LI2: inactive (not assigned)
  - LI3: switching of 2nd speed reference
  - LI4: fault reset
  - LI5, LI6: inactive (not assigned)
- Analog inputs:
  - AI1: 1st speed reference 0–10 V.
  - AI2: 2nd speed reference 0–20 mA
- Relay R1: The contact opens in the event of a fault (or drive off)
- Relay R2: The contact closes when the drive controller is running
- Analog output AO1: 0–20 mA, motor frequency

For programming instructions, refer to the ATV61 programming guide located on the CD-ROM included with the drive controller.

Option card factory settings

The option card inputs/outputs are not factory-set.

Power switching via line contactor

CAUTION
EQUIPMENT DAMAGE • Avoid operating the contactor frequently (premature aging of the filter capacitors). • Cycle times < 60 s can result in damage to the pre-charge resistor. **Failure to follow these instructions can result in equipment damage.**

Starting

Important:

In factory settings mode, the motor can only be supplied with power once the Forward, Reverse, and DC Injection Stop commands are reset:
- On power-up
- On manual fault reset
- After a stop command

If the commands have not been reset, the drive controller displays "nSt" and does not start.

Test on a low-power motor or without a motor, using motors in parallel

Consult the CD-ROM supplied with the drive controller.

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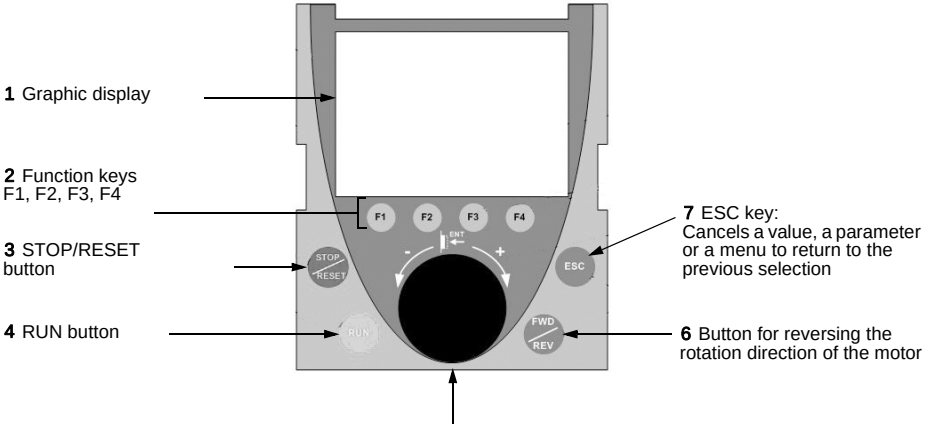
Graphic Display Terminal

Although the graphic display terminal is optional for low-power drive controllers, it is a standard component on high-power drive controllers (see catalog). The graphic display terminal can be disconnected and connected remotely (on the door of an enclosure, for example) using the cables and accessories available as options (see catalog).

Description of graphic display terminal


1 Graphic display
2 Function keys F1, F2, F3, F4
3 STOP/RESET button
4 RUN button
F1
F2
F3
F4
ENT
STOP
RESET
RUN
ESC
FWD
REV
7 ESC key: Cancels a value, a parameter or a menu to return to the previous selection
6 Button for reversing the rotation direction of the motor
5 Navigation button:
• Press (ENT): - To save the current value
- To enter the selected menu or parameter
• Turn CW/CCW: - To increment or decrement a value
- To go to the next or previous line
- To increase or decrease the reference if control via the terminal is activated

Note: Buttons 3, 4, 5, and 6 can be used to control the drive controller directly, if control via the graphic display terminal is activated.

Drive controller state codes:

- ACC: Acceleration
- CLI: Current limiting
- CTL: Controlled stop on input phase loss
- DCB: DC injection braking in progress
- DEC: Deceleration
- FLU: Motor fluxing in progress
- FRF: Drive at fallback speed
- FST: Fast stop
- NLP: No line power (no line supply on L1, L2, L3)
- NST: Freewheel stop
- OBR: Auto-adapted deceleration
- PRA: Power Removal function active (drive locked)
- RDY: Drive ready
- RUN: Drive running
- SOC: Controlled output cut in progress
- TUN: Auto-tuning in progress
- USA: Undervoltage alarm

The first time the drive controller is powered up, the user is automatically guided through the menus as far as [1. DRIVE MENU].
The parameters in the [1.1 SIMPLY START] submenu must be configured and auto-tuning performed before the motor is started up.

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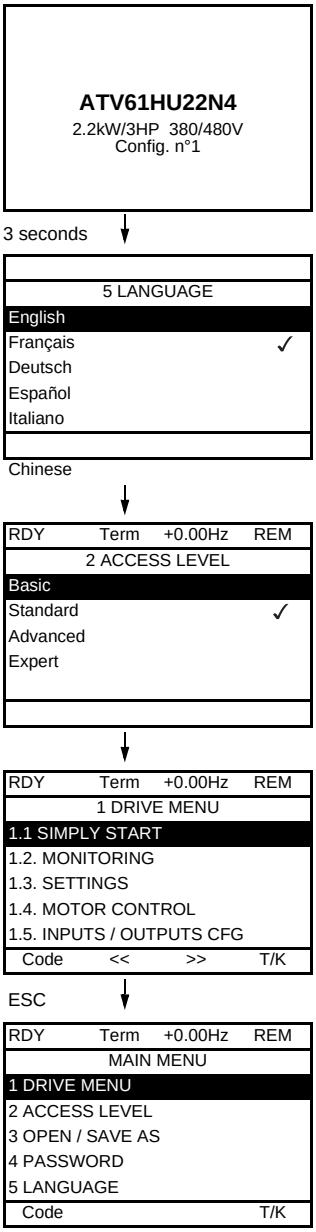
Only the [1.1 SIMPLY START] menu is described in this document. To find out the content of the other menus, consult the CD-ROM supplied with the drive controller.



Displayed for 3 seconds following power-up

Switches to [5 LANGUAGE] menu automatically.

Select the language and press ENT

Switches to [2 ACCESS LEVEL] menu
(consult the CD-ROM supplied with the drive controller)
Select the access level and press ENT.

Switches to [1 DRIVE MENU]
(consult the CD-ROM supplied with the drive controller)

Press ESC to return to [MAIN MENU]

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Integrated Display Terminal

Low-power Altivar 61 drives (see catalog) feature an integrated display terminal with a 7-segment 4-digit display. The graphic display terminal described on the previous pages can also be connected to these drive controllers as an option.

Functions of the display and the keys

- Returns to the previous menu or parameter, or increases the displayed value
- Goes to the next menu or parameter, or decreases the displayed value
- Exits a menu or parameter, or aborts the displayed value to return to the previous value in the memory
- Enters a menu or a parameter, or saves the displayed parameter or value

Note:
- Pressing ▲ or ▼ does not store the choices.
- Press and hold down (>2 s) ▲ or ▼ to scroll through the data quickly.

Save and store the selection: ENT

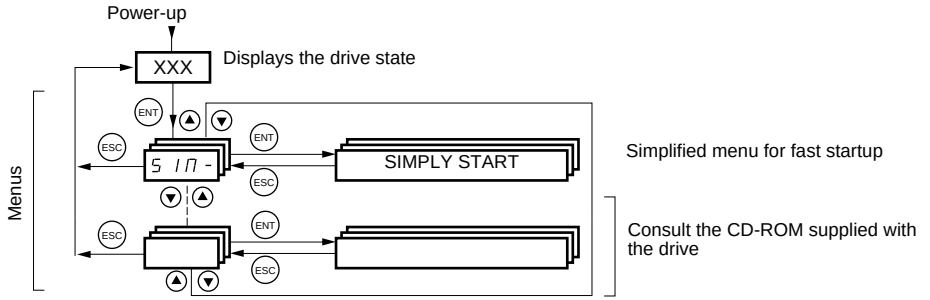
The display flashes when a value is stored.

Normal display, with no fault present and no startup:

- 43.0 : Display of the parameter selected in the SUP menu (default selection: motor frequency)
- CLI: Current limit
- CtL: Controlled stop on input phase loss
- dCb: DC injection braking in progress
- FLU: Motor fluxing in progress
- FrF: Drive at fallback speed
- FSt: Fast stop
- nLP: No line power (no line supply on L1, L2, L3)
- nSt: Freewheel stop
- Obr: Auto-adapted deceleration
- PrA: Power Removal function active (drive locked)
- rdY: Drive ready
- rUn: Drive running
- SOC: Controlled output cut in progress
- tUn: Auto-tuning in progress
- USA: Undervoltage alarm

The display flashes to indicate the presence of a fault.

Accessing menus



A dash appears after menu and submenu codes to differentiate them from parameter codes.
Examples : SIM- menu, ACC parameter.

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[1.1 SIMPLY START] (SIM-) Menu

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Changes to parameters in other menus may change the [1.1 SIMPLY START] (SIM-) parameter settings.
- Read and understand the ATV61 Programming Manual before configuring parameter values

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The [1.1-SIMPLY START] (SIM-) menu can be used for fast startup, which is sufficient for the majority of applications.

Note: The parameters of the [1.1 SIMPLY START] (SIM-) menu must be entered in the order in which they appear, as the later ones are dependent on the first ones.
For example [2/3 wire control] (tCC) must be configured before any other parameters.

Macro configuration

Macro configuration provides a means of speeding up the configuration of functions for a specific field of application.

Selecting a macro configuration assigns the Inputs/Outputs in this macro configuration.

Input/ output	[Start/Stop]	[Gen. Use]	[PID regul.]	[Network C.]	[Pumps.Fans]
AI1	[Ref.1 channel]	[Ref.1 channel]	[Ref.1 channel] (PID reference)	[Ref.2 channel] ([Ref.1 channel] = integrated Modbus)	[Ref.1 channel]
AI2	[No]	[Summing ref. 2]	[PID feedback]	[No]	[Ref.1B channel]
AO1	[Motor freq.]	[Motor freq.]	[Motor freq.]	[Motor freq.]	[Motor freq.]
R1	[No drive flt]	[No drive flt]	[No drive flt]	[No drive flt]	[No drive flt]
R2	[No]	[No]	[No]	[No]	[Drv running]
LI1 (2-wire)	[Forward]	[Forward]	[Forward]	[Forward]	[Forward]
LI2 (2-wire)	[Fault reset]	[Reverse]	[Fault reset]	[Fault reset]	[No]
LI3 (2-wire)	[No]	[Jog]	[PID integral reset]	[Ref. 2 switching]	[Ref 1B switching]
LI4 (2-wire)	[No]	[Fault reset]	[2 preset PID ref.]	[Forced local]	[Fault reset]
LI5 (2-wire)	[No]	[Torque limitation]	[4 preset PID ref.]	[No]	[No]
LI6 (2-wire)	[No]	[No]	[No]	[No]	[No]
LI1 (3-wire)	Stop	Stop	Stop	Stop	Stop
LI2 (3-wire)	[Forward]	[Forward]	[Forward]	[Forward]	[Forward]
LI3 (3-wire)	[Fault reset]	[Reverse]	[Fault reset]	[Fault reset]	[No]
LI4 (3-wire)	[No]	[Jog]	[PID integral reset]	[Ref. 2 switching]	[Ref 1B switching]
LI5 (3-wire)	[No]	[Fault reset]	[2 preset PID ref.]	[Forced local]	[Fault reset]
LI6 (3-wire)	[No]	[Torque limitation]	[4 preset PID ref.]	[No]	[No]

The assignment of inputs LI1 to LI6 differs in 3-wire control.

Note: All these can be modified, adjusted and reassigned: consult the CD-ROM supplied with the drive controller.

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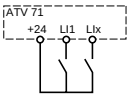
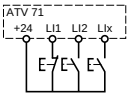
Code	Name/Description	Adjustment range	Factory setting
tCC	**❑ [2/3 wire control]**		[2 wire] (2C)
2C 3C	☐ **[2 wire]** (2C) ☐ **[3 wire]** (3C)		

2-wire control: This is the input state (0 or 1) or edge (0 to 1 or 1 to 0), which controls running or stopping.



Example of "source" wiring:
LI1: forward
LIx: reverse

3-wire control
(Pulse control): A "forward" or "reverse" pulse is sufficient to command starting, a "stop" pulse is sufficient to command stopping.



Example of "source" wiring:

LI1: stop
LI2: forward
LIx: reverse

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

To change the assignment of [2/3 wire control] (tCC) press the ENT key for 2 s.
The following function will be returned to factory settings: [2 wire type] (tCt), as will the functions assigning the logic inputs (consult the CD-ROM with the drive controller).
The macro configuration selected will also be reset if it has been customized (loss of custom settings). Check that this change is compatible with the wiring diagram used.

Failure to follow this instruction can result in death or serious injury.

CFG	**❑ [Macro configuration]**		[Pumps.Fans] (PnF)
StS GEn PId nEt PnF	☐ **[Start/Stop]** (StS): Start/stop ☐ **[Gen. Use]** (GEn): General use ☐ **[PID regul.]** (PId): PID regulation ☐ **[Network C.]** (nEt): Communication bus ☐ **[Pumps.Fans]** (PnF): Pumps/fans		

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

To change the assignment of [Macro configuration] (CFG) press the ENT key for 2 s.
Check that the selected macro configuration is compatible with the wiring diagram used.

Failure to follow this instruction can result in death or serious injury.

CCFG	**❑ [Customized macro]**		
	Read-only parameter, only visible if at least one macro configuration parameter has been modified.		
YES	☐ **[Yes]** (YES)		

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Code	Name/Description	Adjustment range	Factory setting
bFr	❑ **[Standard mot. freq]**		[50 Hz IEC] (50)
50 60	☐ **[50 Hz IEC] (50)**: IEC ☐ **[60 Hz NEMA] (60)**: NEMA This parameter modifies the presets of the following parameters: [Rated motor power] (nPr), [Rated motor volt.] (UnS), [Rated mot. current] (nCr), [Rated motor freq.] (FrS), [Rated motor speed] (nSP) and [Max frequency] (tFr) below, [Mot. therm. current] (ItH) page 34, [High speed] (HSP) page 34.		
IPL	❑ **[Input phase loss]**		According to drive rating
nO YES	☐ **[Ignore]** (nO): Fault ignored, to be used when the drive controller is supplied via a single phase supply or by the DC bus. ☐ **[Freewheel]** (YES): Fault with freewheel stop. If one phase is lost, the drive controller switches to fault mode [Input phase loss] (IPL) but if 2 or 3 phases are lost, the drive controller continues to operate until it trips on an undervoltage fault. This parameter is only accessible in this menu on ATV61H037M3 to HU75M3 drive controllers (used with a single-phase supply).		
nPr	❑ **[Rated motor power]**	According to drive rating	According to drive rating
	Rated motor power given on the nameplate, in kW if [Standard mot. freq] (bFr) = [50 Hz IEC] (50), in HP if [Standard mot. freq] (bFr) = [60 Hz NEMA] (60).		
UnS	❑ **[Rated motor volt.]**	According to drive rating	According to drive rating and [Standard mot. freq] (bFr)
	Rated motor voltage given on the nameplate. ATV61●●●M3: 100 to 240 V ATV61●●●N4: 200 to 480 V		
nCr	❑ **[Rated mot. current]**	0.25 to 1.1 or 1.2 Hz according to rating (1)	According to drive rating and [Standard mot. freq] (bFr)
	Rated motor current given on the nameplate.		
FrS	❑ **[Rated motor freq.]**	10 to 500 or 1000 Hz according to rating	50 Hz
	Rated motor frequency given on the nameplate. The factory setting is 50 Hz, or preset to 60 Hz if [Standard mot. freq] (bFr) is set to 60 Hz.		
nSP	❑ **[Nom motor speed]**	0 to 60000 RPM	According to drive rating
	Rated motor speed given on the nameplate. 0 to 9999 rpm then 10.00 to 60.00 krpm on the integrated display terminal. If, rather than the rated speed, the nameplate indicates the synchronous speed and the slip in Hz or as a %, calculate the rated speed as follows: • Nominal speed = Synchronous speed x $\frac{100 - \text{slip as a \%}}{100}$ or • Nominal speed = Synchronous speed x $\frac{50 - \text{slip in Hz}}{50}$ (50 Hz motors) or • Nominal speed = Synchronous speed x $\frac{60 - \text{slip in Hz}}{60}$ (60 Hz motors)		
tFr	❑ **[Max frequency]**	10 to 1000 Hz	60 Hz
	The factory setting is 60 Hz, or preset to 72 Hz if [Standard mot. freq] (bFr) is set to 60 Hz. The maximum value is limited by the following conditions: • It must not exceed 10 times the value of [Rated motor freq.] (FrS) • Values between 500 Hz and 1000 Hz are only possible in V/F control and for powers limited to 37 kW (50 HP) for ATV61H●●● and 45 kW (60 HP) for ATV61W●●●. In this case configure [Motor control type] (Ctt) before [Max frequency] (tFr).		

(1) "In" corresponds to the rated drive controller current indicated in the Installation Manual and on the drive controller nameplate.

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Code	Name/Description	Factory setting
tUn nO YES dOnE	❑ **[Auto tuning]**	[No] (nO)

DANGER

HAZARD OF ELECTRIC SHOCK OR ARC FLASH

- During auto tuning, the motor operates at rated current.
- Do not service the motor during auto tuning.

Failure to follow these instructions will result in death or serious injury.

CAUTION

UNINTENDED EQUIPMENT OPERATION

- The following motor parameters must be correctly configured before starting auto tuning: [Rated motor volt.] (UnS), [Rated motor freq.] (FrS), [Rated mot. current] (nCr), [Rated motor speed] (nSP), and [Rated motor power] (nPr).
- If one or more of these parameters is modified after auto tuning has been performed, Auto tuning (tUn) will be set to [No] and the procedure must be repeated.

Failure to follow these instructions can result in death or serious injury.

☐ **[No]** (nO): Auto-tuning not performed.
☐ **[Yes]** (YES) : Auto-tuning is performed as soon as possible, then the parameter automatically changes to [Done] (dOnE).
☐ **[Done]** (dOnE): Use of the values given the last time auto-tuning was performed.
Caution:

- It is essential that all motor parameters ([Rated motor volt.] (UnS), [Rated motor freq.] (FrS), [Rated mot. current.] (nCr), [Rated motor speed] (nSP), [Rated motor power] (nPr)) are configured correctly before starting auto-tuning.
  If one or more of these parameters is modified after auto-tuning has been performed, [Auto tuning] (tUn) will return to [No] (nO) and the procedure must be repeated.
- Auto-tuning is performed only if no stop command has been activated. If a freewheel stop or fast stop function has been assigned to a logic input, this input must be set to 1 (active at 0).
- Auto-tuning takes priority over any run or prefluxing commands, which will take effect after the auto-tuning sequence.
- If auto-tuning fails, the drive controller displays [No] (nO) and, depending on the configuration of [Autotune fault mgt] (tnL) (consult the CD-ROM supplied with the drive controller), may switch to [Auto-tuning] (tnF) fault mode.
- Auto-tuning may last for 1 to 2 seconds. Do not interrupt; wait for the display to change to [Done] (dOnE) or [No] (nO).

Note: During auto-tuning the motor operates at rated current.

tUS tAb PEnd PrOG FAIL dOnE	❑ **[Auto tuning status]** (for information only, cannot be modified) ☐ **[Not done]** (tAb): The default stator resistance value is used to control the motor. ☐ **[Pending]** (PEnd): Auto-tuning has been requested but not yet performed. ☐ **[In Progress]** (PrOG): Auto-tuning in progress. ☐ **[Failed]** (FAIL): Auto-tuning has failed. ☐ **[Done]** (dOnE): The stator resistance measured by the auto-tuning function is used to control the motor.	[Not done] (tAb)
PHr AbC ACb	❑ **[Output Ph rotation]** ☐ **[ABC]** (AbC): Forward ☐ **[ACB]** (ACb): Reverse This parameter can be used to reverse the rotation direction of the motor without reversing the wiring.	[ABC] (AbC)

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Parameters that can be changed during operation or when stopped

Code	Name/Description		Factory setting
ItH	❑ **[Mot. therm. current]**	0 to 1.1 or 1.2 In (1) according to rating	According to drive rating
	Motor thermal protection current, to be set to the rated current indicated on the nameplate.		
ACC	❑ **[Acceleration]**	0.1 to 999.9 s	3.0 s
	Time to accelerate from 0 to the [Rated motor freq.] (FrS) (page 32). Make sure that this value is compatible with the inertia being driven.		
dEC	❑ **[Deceleration]**	0.1 to 999.9 s	3.0 s
	Time to decelerate from the [Rated motor freq.] (FrS) (page 32) to 0. Make sure that this value is compatible with the inertia being driven.		
LSP	❑ **[Low speed]**		0
	Motor frequency at minimum reference, can be set between 0 and [High speed] (HSP).		
HSP	❑ **[High speed]**		50 Hz
	Motor frequency at maximum reference, can be set between [Low speed] (LSP) and [Max frequency] (tFr). The factory setting changes to 60 Hz if [Standard mot. freq] (bFr) = [60 Hz] (60).		

(1) "In" corresponds to the rated drive controller current indicated in the Installation Manual and on the drive controller nameplate.

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Faults and Troubleshooting

Drive does not start, no fault displayed

- If the display does not light up, check the power supply to the drive controller.
- If the drive controller displays [Freewheel] (nSt) or [Fast stop] (FSt):
  The Fast Stop or Freewheel functions prevent the drive controller from starting if the corresponding logic inputs are not powered up. This is normal— these functions are active at zero so that the drive controller will stop safely if there is a wire break.
- Make sure that the run command input or inputs are activated according to the selected control mode. For instructions on how to adjust the tCt parameter refer to ATV61 programming manual on the CD-ROM.

Faults that cannot be reset automatically

⚠ DANGER

LOSS OF PERSONNEL AND EQUIPMENT PROTECTION

- Enabling the fault inhibition parameter (InH) will disable the drive controller protection features.
- InH should not be enabled for typical applications of this equipment.
- InH should be enabled only in extraordinary situations where a thorough risk analysis demonstrates that the presence of adjustable speed drive protection poses a greater risk than personnel injury or equipment damage.

Failure to follow these instructions will result in death or serious injury.

The cause of the fault must be removed before resetting by turning off and then back on.
AI2F, EnF, SOF, SPF and tnF faults can also be reset remotely by means of a logic input or control bit (consult the CD-ROM supplied with the drive controller). EnF, InFA, InFb, SOF, SPF and tnF faults can be inhibited and cleared remotely by means of a logic input or control bit (consult the CD-ROM supplied with the drive controller).

Fault	Name	Probable cause	Remedy
AI2F	[AI2 input]	• AI2 signal out of range	• Check the wiring of analog input AI2 and the value of the signal.
bOF	[DBR overload]	• Incorrect DB settings.	• Check the size of the resistor and wait for it to cool down. • Check parameters [DB Resistor Power] (brP) and [DB Resistor value] (brU) (consult the CD-ROM supplied with the drive controller).
bUF	[DB unit sh. Circuit]	• Short-circuit output from braking unit	• Check the wiring of the braking unit and the resistor. • Check the braking resistor.
CrF1	[Precharge]	• Charging relay control fault or charging resistor damaged	• Turn the drive controller off and then back on again. • Check the internal connections. • Contact Schneider Electric Product Support.
CrF2	[Thyr. soft charge]	• DC bus charging fault (thyristors)	
EEF1	[Control Eeprom]	• Internal memory fault, control card	• Check the environment (electromagnetic compatibility). • Turn off, reset, return to factory settings. • Contact Schneider Electric Product Support.
EEF2	[Power Eeprom]	• Internal memory fault, power card	
FCF1	[Out. contact. stuck]	• The output contactor remains closed although the opening conditions have been met	• Check the contactor and its wiring. • Check the feedback circuit.
HdF	[IGBT desaturation]	• Short-circuit or grounding at the drive controller output	• Check the cables connecting the drive controller to the motor, and the motor insulation. • Perform the diagnostic tests via the [1.10 DIAGNOSTICS] menu.
ILF	[internal com. link]	• Communication fault between option card and drive controller	• Check the environment (electromagnetic compatibility). • Check the connections. • Check that no more than 2 option cards (max. permitted) have been installed on the drive controller. • Replace the option card. • Contact Schneider Electric Product Support.
InF1	[Rating error]	• The power card is different from the card stored	• Check the catalog reference of the power card.

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Faults, that cannot be reset automatically (continued)

Fault	Name	Probable cause	Remedy
InF2	[Incompatible PB]	• The power card is incompatible with the control card	• Check the catalog reference of the power card and its compatibility.
InF3	[Internal serial link]	• Communication fault between the internal cards	• Check the internal connections. • Contact Schneider Electric Product Support.
InF4	[Internal MFG area]	• Internal data inconsistent	• Recalibrate the drive • Contact Schneider Electric Product Support.
InF6	[Internal-option]	• The option installed in the drive is not recognized	• Check the catalog reference and compatibility of the option.
InF7	[Internal-hard init.]	• Initialization of the drive is incomplete	• Turn off and reset.
InF8	[Internal-ctrl supply]	• The control section power supply is incorrect	• Check the control section power supply.
InF9	[Internal- I measure]	• The current measurements are incorrect	• Replace the current sensors or the power card. • Contact Schneider Electric Product Support.
InFA	[Internal-mains circuit]	• The input stage is not operating correctly	• Perform the diagnostic tests via the [1.10 DIAGNOSTICS] menu. • Contact Schneider Electric Product Support.
InFb	[Internal- th. sensor]	• The drive temperature sensor is not operating correctly	• Replace the temperature sensor. • Contact Schneider Electric Product Support.
InFC	[Internal-time meas.]	• Fault on the electronic time measurement component	• Contact Schneider Electric Product Support.
InFE	[internal- CPU]	• Internal microprocessor fault	• Turn off and reset. Contact Schneider Electric Product Support.
OCF	[Overcurrent]	• Motor parameters not correct • Inertia or load too great • Mechanical locking	• Check the parameters. • Check the size of the motor/drive/load. • Check the state of the mechanism.
PrF	[Power removal]	• Fault with the drive's "Power removal" safety function	• Contact Schneider Electric Product Support.
SCF1	[Motor short circuit]	• Short-circuit or grounding at the drive output	• Check the cables connecting the drive to the motor, and the motor insulation. • Perform the diagnostic tests via the [1.10 DIAGNOSTICS] menu. • Reduce the switching frequency.
SCF2	[Impedant sh. circuit]		
SCF3	[Ground short circuit]	• Significant earth leakage current at the drive output if several motors are connected in parallel	• Connect chokes in series with the motor.
SOF	[Overspeed]	• Instability or driving load too great	• Check the motor, gain, and stability parameters. • Add a braking resistor. • Check the size of the motor/drive/load.
tnF	[Auto-tuning]	• Special motor or motor power not suitable for the drive • Motor not connected to the drive	• Check that the motor and drive controller are compatible. • Check that the motor is present during auto-tuning. • If an output contactor is being used, close it during auto-tuning.

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Faults that can be reset with the automatic restart function, after the cause has been removed

⚠ DANGER

LOSS OF PERSONNEL AND EQUIPMENT PROTECTION

- Enabling the fault inhibition parameter (InH) will disable the drive controller protection features.
- InH should not be enabled for typical applications of this equipment.
- InH should only be enabled in extraordinary situations where a thorough risk analysis demonstrates that the presence of adjustable speed drive protection poses a greater risk than personnel injury or equipment damage.

Failure to follow these instructions will result in death or serious injury.

These faults can also be reset by turning the drive controller off then on again or by means of a logic input or control bit (consult the CD-ROM supplied with the drive controller).
APF, CnF, COF, EPF1, EPF2, FCF2, LFF2, LFF3, LFF4, nFF, ObF, OHF, OLC, OLF, OPF1, OPF2, OSF, OtF1, OtF2, OtFL, PHF, PtF1, PtF2, PtFL, SLF1, SLF2, SLF3, SPIF, SSF, tJF, and ULF faults can be inhibited and cleared remotely by means of a logic input or control bit (consult the CD-ROM supplied with the drive controller).

Fault	Name	Probable cause	Remedy
APF	[Application fault]	• Controller internal card fault	• Refer to the card documentation.
CnF	[Com. network]	• Communication fault on communication card	• Check the environment (electromagnetic compatibility). • Check the wiring. • Check the time-out. • Replace the option card. • Contact Schneider Electric Product Support.
COF	[CAN com.]	• Interruption in communication on the CANopen bus	• Check the communication bus. • Check the time-out. • Refer to the CANopen user's manual.
EPF1	[External flt-LI/Bit]	• Fault triggered by an external device, depending on user	• Check the device which caused the fault, and reset.
EPF2	[External fault com.]	• Fault triggered by a communication network	• Check for the cause of the fault and reset.
FCF2	[Out. contact. open.]	• The output contactor remains open although the closing conditions have been met	• Check the contactor and its wiring. • Check the feedback circuit.
LCF	[input contactor]	• The drive is not turned on even though [Mains V. time out] (LCt) has elapsed.	• Check the contactor and its wiring. • Check the time-out. • Check the line/contactor/drive connection.
LFF2 LFF3 LFF4	[AI2 4-20mA loss] [AI3 4-20mA loss] [AI4 4-20mA loss]	• Loss of the 4-20 mA reference on analog input AI2, AI3 or AI4	• Check the connection on the analog inputs.
nFF	[No Flow Fault]	• Zero fluid	• Check and correct the cause of the fault. • Check the zero fluid detection parameters (consult the CD-ROM supplied with the drive).
ObF	[Overbraking]	• Braking ramp too short • Overhauling load	• Increase the deceleration time. • Install a braking resistor if necessary. • Activate the [Dec ramp adapt.] (brA) function (consult the CD-ROM supplied with the drive), if it is compatible with the application.
OHF	[Drive overheat]	• Drive temperature too high	• Check the motor load, the drive ventilation, and the ambient temperature. Wait for the drive to cool down before restarting.
OLC	[Proc.Overload Flt]	• Process overload	• Check and remove the cause of the overload. • Check the parameters of the [PROCESS UNDERLOAD] (OLd-) function (consult the CD-ROM supplied with the drive).

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Faults that can be reset with the automatic restart function, after the cause has been removed (continued)

Fault	Name	Probable cause	Remedy
OLF	[Motor overload]	• Triggered by excessive motor current	• Check the setting of the motor thermal protection, check the motor load. Wait for the drive to cool down before restarting.
OPF1	[1 motor phase loss]	• Loss of one phase at drive output	• Check the connections from the drive to the motor.
OPF2	[3 motor phase loss]	• Motor not connected or motor power too low • Output contactor open • Instantaneous instability in the motor current	• Check the connections from the drive to the motor. • If an output contactor is being used, consult the CD-ROM supplied with the drive. • Test on a low-power motor or without a motor: In factory settings mode, motor phase loss detection is active [Output Phase Loss] (OPL) = [Yes] (YES). To check the drive in a test or maintenance environment without having to switch to a motor with the same rating as the drive (particularly useful in the case of high-power drives), deactivate motor phase loss detection [Output phase loss] (OPL) = [No] (nO). • Check and optimize the parameters [Rated motor volt.] (UnS) and [Rated mot. current.] (nCr) and perform an [Auto tuning] (tUn).
OSF	[Mains overvoltage]	• Line voltage too high • Disturbed line supply	• Check the line voltage.
OTF1	[PTC1 overheat]	• Overheating of the PTC1 probes detected	• Check the motor load and motor size. • Check the motor ventilation. • Wait for the motor to cool before restarting. • Check the type and state of the PTC probes.
OTF2	[PTC2 overheat]	• Overheating of the PTC2 probes detected	
OTFL	[PTC=LI6 overheat]	• Overheating of PTC probes detected on input LI6.	
PTF1	[PTC1 probe]	• PTC1 probes open or short-circuited	• Check the PTC probes and the wiring between them and the motor/controller.
PTF2	[PTC2 probe]	• PTC2 probes open or short-circuited	
PTFL	[LI6=PTC probe]	• PTC probes on input LI6 open or short-circuited	
SCF4	[IGBT short circuit]	• Power component fault	• Perform a test via the [1.10 DIAGNOSTICS] menu. • Contact Schneider Electric Product Support.
SCF5	[Motor short circuit]	• Short-circuit at drive output	• Check the cables connecting the drive to the motor, and the motor insulation. • Perform a test via the [1.10 DIAGNOSTICS] menu. • Contact Schneider Electric Product Support.
SLF1	[Modbus com.]	• Interruption in communication on the Modbus bus	• Check the communication bus. • Check the time-out. • Refer to the Modbus User's Manual.
SLF2	[PowerSuite com.]	• Fault communicating with PowerSuite	• Check the PowerSuite connecting cable. • Check the time-out.
SLF3	[HMI com.]	• Fault communicating with the graphic display terminal	• Check the terminal connection. • Check the time-out.
SPIF	[PI Feedback]	• PID feedback below the lower limit	• Check the PID function feedback. • Check the PID feedback supervision threshold and time delay (consult the CD-ROM supplied with the drive).
SSF	[Torque/current lim]	• Switch to torque limitation	• Check if there are any mechanical problems. • Consult the CD-ROM supplied with the drive.

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Faults that can be reset with the automatic restart function, after the cause are removed (continued)

Fault	Name	Probable cause	Remedy
tJF	[IGBT overheat]	• Drive overheated	• Check the size of the load/motor/drive. • Reduce the switching frequency. • Wait for the drive controller to cool before restarting.
ULF	[Proc. Underload Flt]	• Process underload	• Check and remove the cause of the underload. • Consult the CD-ROM supplied with the drive.

Faults that can be reset as soon as their causes are removed

⚠ DANGER

LOSS OF PERSONNEL AND EQUIPMENT PROTECTION

- Enabling the fault inhibition parameter (InH) will disable the drive controller protection features.
- InH should not be enabled for typical applications of this equipment.
- InH should only be enabled in extraordinary situations where a thorough risk analysis demonstrates that the presence of adjustable speed drive protection poses a greater risk than personnel injury or equipment damage.

Failure to follow these instructions will result in death or serious injury.

The USF fault can be inhibited and cleared remotely by means of a logic input or control bit ([Fault inhibit assign.] (InH). Consult the CD-ROM supplied with the drive controller.

Fault	Name	Probable cause	Remedy
CFF	[Incorrect config.]	• Option card changed or removed • The current configuration is inconsistent	• Check that there are no card errors. • In the event of the option card being changed/removed deliberately, consult the CD-ROM supplied with the drive. • Return to factory settings or retrieve the backup configuration, if it is valid (consult the CD-ROM supplied with the drive).
CFI	[Invalid config.]	• Invalid configuration. The configuration loaded in the drive via the bus or network is inconsistent.	• Check the configuration loaded previously. • Load a compatible configuration.
HCF	[Cards pairing]	• The [CARDS PAIRING] (PPI-) function has been configured and a drive card has been changed	• Consult the CD-ROM supplied with the drive.
PHF	[Input phase loss]	• Drive incorrectly supplied or a fuse blown • Failure of one phase • 3-phase ATV61 used on a single phase line supply • Unbalanced load This protection only operates with the drive on load	• Check the power connection and the fuses. • Use a 3-phase mains supply. • Disable the fault by [Input phase loss] (IPL) = [No] (nO).
PrtF	[Power Ident]	• The [Power Identification] (Prt) parameter is incorrect. • Control card replaced by a control card configured on a drive with a different rating	• Enter the correct parameter (reserved for Schneider Electric product support). • Check that there are no card errors. • In the event of the control card being changed deliberately, consult the CD-ROM supplied with the drive.

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Faults that can be reset as soon as their causes are removed (continued)

Fault	Name	Probable cause	Remedy
USF	[Undervoltage]	• Line supply too low • Transient voltage dip • Damaged pre-charge resistor	• Check the voltage and the voltage parameter (consult the CD-ROM supplied with the drive). • Replace the pre-charge resistor. • Contact Schneider Electric Product Support.

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